REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks below is respectfully requested.

Claims 1-23 are currently before the Examiner. Claims 1, 9 and 19 are currently amended. Claims 3 and 13 are currently cancelled.

Claim 9 stands rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended claim 9 amending the term "missing" to "mixing". Reconsideration of the rejection is respectfully requested.

Claims 1-23 stand rejected under 35 USC § 103(a) and as being unpatentable over Imai, US 5,120,355, in view of Luongo, US 6,251,979. The rejection is respectfully traversed.

Initially, applicants have cancelled claims 3 and 13, and incorporated the subject matter into the the independent claims to further define that the alkyl phenol used is a $C_{24} - C_{34}$ methylene coupled alkyl phenol.

Applicants present invention, for gypsum products, comprises a wax, an alkyl phenol, a polynaphthalenesulfonic acid, an alkali metal hydroxide, water and a complexed starch to produce gypsum products with less degradation of the pH due to bacteriological activity, no decomposition of sodium lignasulfate in long-term storage, less viscosity changes with temperature and age, and increased predictable use rate at the mixer.

Imai does not teach the use of a C_{24} - C_{34} methylene coupled alkyl phenol. Imai teaches a hydrocarbon resin which may or may not contain phenol, wherein the only phenols taught or suggested are phenol, catechol, resorcinol and hydroquinone (column 3, lines 54-63).

The present invention uses a C_{24} - C_{34} methylene coupled alkyl phenol with the polynahphalenesulfonic acid to modify the wax crystals of the wax and to allow the wax crystals to resist plating and linking with themselves. The incorporation of the C_{24} - C_{34} methylene coupled alkyl phenol allows the crystals to remain in a disassociated state until they are transferred due to the polarity of the gypsum. The wax crystals are then able to align and coat the gypsum products, providing a beneficial water resistant property.

Luongo does not resolve the deficiencies of Imai. Luongo teaches a wallboard composition comprising a combination of synthetic binders with an expanded mineral (e.g. Perlite) that reduces the amount of gypsum used. Imai's overall result is described as a "complete crosslinking between the starch, borate, and synthetic adhesive to form a strengthened web for gripping the Perlite..." (column 12, lines 35-41). The combination of Imai, in view of the teachings of Luongo, would at best suggest lightening the gypsum board, by reducing the amount of gypsum used.

Applicants use of a complexing starch distinguishes itself from Luongo, in addition to being unique from previous uses of starch in gypsum. Previously, starch was only used as an adhesive on the outer surface of the gypsum to attach the paper to. The present invention not only uses the starch on the inside of the gypsum but uses the complexing starch to complex impurities in the gypsum board itself.

As described in Luongo, starch and borate can be combined to form a binder to give a wallboard strength but traditionally gypsum compositions rather rely on the gypsum crystal growth brought about by the heat treatment of the wallboard in its final manufacturing stage. "Thus, traditional gypsum wallboard compositions do not rely on the adhesive nature of the combination of starch and borate" (Column 12, lines 59-61). If starch were to be used in a gypsum board it would only be used on the outside of the gypsum to attach the paper to.

The present invention utilizes a complexed starch to complex the impurities inside the gypsum board thereby increasing the water resistance of the gypsum board, improve foam

support and improve slurry additive compatibility. Reconsideration of this rejection is respectfully requested.

Claims 1-23 are provisionally rejected on the ground of nonstatutory obvious-type double patenting over claims 1-32 of copending application no. 10/525,912 in view of Song. The rejection is respectfully traversed.

Copending application no. 10/525,912 is not anticipated by or a mere obvious variation of the present invention and accordingly should not be provisionally rejected on the ground of nonstatutory obvious-type double patenting. Copending application no. 10/525,912 is used to provide water resistance solely for lignocellulosic composites. Lignocellulosic composites are in the natural organic substrate industry which is a different industry than the inorganic calcium sulfate industry of gypsum. There are many differences between calcium sulfate and lignocellulosic composites such as the differences in substrate size and different processes of manufacture.

The differences in which the present invention utilizes its starch and wax to obtain water resistance versus copending application no. 10/515,912 are great enough so that they are patently distinct. The present invention obtains its water resistance of the gypsum board by complexing the impurities of the gypsum, while copending application no. 10/525,912 obtains its water resistance of the lignocellulosic composite by providing a uniform and predictable distribution of wax over the lignocellulosic particles.

In the present invention, the complexed starch causes an increase in the water resistance of the gypsum board by complexing the impurities of the gypsum. Wax crystals align and coat the gypsum products, providing an additional water resistant property. The aligned wax crystals resist plating and linking with themselves due to the modification they undergo when C_{24} - C_{34} methylene coupled alkyl phenol is mixed polynahphalenesulfonic acid.

The complexed starch, of copending application no. 10/525,912, improves water resistance by provides a uniform wax distribution over the wood fibers of the lignocellulosic composite. The complexed starch crosslinks wood fibers together increasing the linear migration of the wax. When the linear migration of the wax is increased, wax is impregnanted into the woodchips providing a uniform and predictable distribution of wax over the lignocellulosic particles. This uniform wax distribution over the crosslinked wood fibers causes the increase in water resistance of the lignocellulosic composites. Reconsideration of this rejection is respectfully requested.

Claims 1-23 are provisionally rejected on the ground of nonstatutory obvious-type double patenting over claims 1-27 of copending application no 10/528,471 in view of Song and Luongo, US 6,251,979. The rejection is respectfully traversed.

Copending application no. 10/528,471 is not anticipated by or a mere obvious variation of the present invention and accordingly should not be provisionally rejected on the ground of nonstatutory obvious-type double patenting. Copending application no. 10/528,471 is for gypsum wood fibers that differ from conventional gypsum wallboard products in that it contains from about 5 to 50 parts of wood fiber with gypsum.

The differences in which the present invention is manufactured versus copending application no. 10/528,471 are great enough so that they are patently distinct. Gypsum boards cannot be made using a gypsum wood fiber process and accordingly gypsum wood fiber boards cannot be made using a gypsum board process.

The gypsum boards of the present invention must be made in either an anionic or a cationic system, which are more hydrophobic and provide enhanced pre-set and set times. Gypsum boards cannot be manufactured in a non-ionic hydroscopic system because such a hydroscopic system will cause the slurry to not set in the manufacturing process.

Gypsum wood fibers require a non-ionic hydroscopic system to ensure that additives are thoroughly mixed throughout the gypsum wood fibers and will not leach out. The additives are needed to ensure that the gypsum wood fibers have the necessary physical properties to be used for interior panels for mobile homes. The surfactant used to create the non-ionic hydroscopic system is a combination of sorbitan monostearate and polyoxyethylene sorbitan monostearate.

One skilled in the art would never attempt to use such a non-ionic hydroscopic system in the manufacture of gypsum board since it would prevent the gypsum board from drying and setting. Gypsum boards must be made in a hydrophobic anionic or a cationic system. By manufacturing the gypsum product in a hydrophobic system one can achieve enhanced pre-set and set times. Reconsideration of this rejection is respectfully requested.

Claims 1-23 are provisionally rejected on the ground of nonstatutory obvious-type double patenting over claims 1-40 of copending application no 10/541,804 in view of Luongo, US 6,251,979. The rejection is respectfully traversed.

Copending application no. 10/541,804 is not anticipated by or a mere obvious variation of the present invention and accordingly should not be provisionally rejected on the ground of nonstatutory obvious-type double patenting. Copending application no. 10/541,804 is used solely for pressure treated lignocellulosic composites. Pressure treated lignocellulosic composites are in the natural organic substrate industry which is a different industry than the inorganic calcium sulfate industry of gypsum. There are many differences between calcium sulfate and lignocellulosic composites such as the differences in substrate size and different processes of manufacture.

The differences in which the present invention utilizes its starch, wax and biocides versus copending application no. 10/541,804 are great enough so that they are patently distinct. The present invention uses starch to complex impurities, wax to coal the gypsum boards and does not require the use of biocides, copending application no. 10/541,804 uses biocides and employs starch and wax both as an incorporator and a carrier of the biocide.

In the present invention, the complexed starch causes an increase in the water resistance of the gypsum board by complexing the impurities of the gypsum. Wax crystals align and coat the gypsum products, providing an additional water resistant property. The aligned wax crystals resist plating and linking with themselves due to the modification they undergo when C_{24} - C_{34} methylene coupled alkyl phenol is mixed polynahphalenesulfonic acid. Additionally, the present application eliminates the need for biocides to control biological activity by eliminating the need of sodium lignasulfate as a cosurfactant and a dispersing aid.

Copending application no. 10/541,804 uses organic biocides in the pressure treating of wood. Currently US legislation is eliminating the use of chemicals such as chromated copper arsenate, copper quat, ammonial copper zinc arsenate, copper bis(dimethyldithiocarbamate), ammoniacal copper citrate and copper azole. In place of these chemicals organic biocides are currently being used as preservatives in wood. However these chemicals can leak out of the wood if the wood does not have strong water resistant properties.

The emulsion of copending application no. 10/541,804 acts as both an incorporator and a carrier of the organic biocide, also as a water proofing medium as it is driven into the wood structure under pressure resulting in a water resistant surface with the inherent protection from weather and insect degradation. As the wax flows through the lignocellulosic composites depositing the organic biocide the holes in the lignocellulosic material are sealed up preventing the organic biocide from leaching out and providing water resistant properties. Reconsideration of this rejection is respectfully requested.

In light of the above amendments and remarks, it is respectfully submitted that the pending claims of the present application are in condition for allowance. If the Examiner has any questions or requires additional information, he is invited to contact the undersigned.

Respectfully submitted,

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